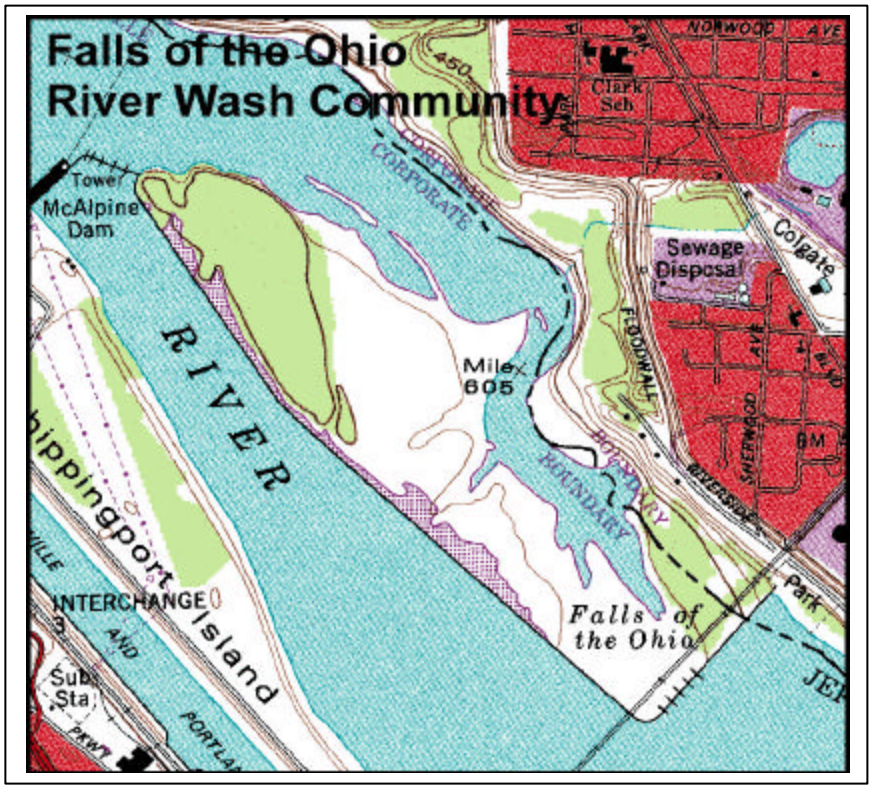
FALLS of the OHIO RIVER WASH PLANT COMMUNITY RESTORATION (IN-68)

1.0 Location



The proposed Falls of the Ohio River Wash Plant Community Restoration project is located on the north shore of the Ohio River in Clark County, Indiana, near Clarksville and Jeffersonville, and is due north of Louisville, Kentucky. The project area is located within the 68 acre Falls of the Ohio State Park which lies within the 1,404 acre Falls of the Ohio National Wildlife Conservation Area. The area is located in the Cannelton Pool between Ohio River Miles (ORM) 605.3 and 606. The area is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

2.0 Project Goal, Description, and Rationale

The primary goal of the Falls of the Ohio River Wash Plant Community Restoration project is to restore the native “river wash” plant community that once existed on the exposed bedrock, fossil beds, and gravel bars adjacent to the shoreline. When the riparian area was in its natural state, floods carrying debris and ice flows frequently inundated and scoured the rocky habitats removing much of the vegetation. In early navigational records, this area was considered the most critical impediment on the 981mile-long Ohio River due to the treacherous waters associated with a river level drop of nearly 26 feet in a distance of 2.5 miles (USACE, 1999). Many early-successional plants

were adapted to this disturbed environment and were able to recolonize the rocky areas following scouring events. The resulting "river wash" plant community, which was similar to a glade/prairie community, was dominated by herbaceous plants. Few trees and shrubs were able to survive the periodic intense scouring that occurred. Construction of the McAlpine Dam immediately upstream from the Falls of the Ohio area altered the frequency and intensity of scouring events and allowed trees and shrubs to become established in areas previously occupied by the "river wash" plant community. This resulted in less plant diversity on the area.

As part of the Ohio River Mainstem Ecosystem Restoration Project, this project would potentially involve removal of willows (*Salix spp*.) and other woody vegetation from the proposed "river wash" plant community restoration area, followed by planting of native herbaceous plants known to historically inhabit the area. This restoration effort could potentially help maintain wild populations of rare plant species, such as the federally-endangered Short's goldenrod (*Solidago shortii*), which was found in this plant community.

3.0 Existing Conditions

Terrestrial/Riparian Habitat: Unvegetated fossil beds and rock outcroppings dominate the terrestrial/riparian habitat in the project area. Sparse stands of young willow trees are scattered among the rocky areas where the herbaceous plants once dominated. Over 270 species of birds have been recorded at the Falls of the Ohio area. More than 600 species of fossils, mostly corals and fishes from the Devonian period, have been described in the fossil beds on the area.

Aquatic Habitats: Aquatic habitats consist of areas of shallow water flowing at moderate rates over bedrock and fossil beds below the dam. Flow rates through the project area are influenced substantially by the McAlpine Dam located immediately upstream. Approximately 125 fish species have been reported near the project area.

Wetlands: Wetland habitats are typically confined to moist holes, cracks, or crevices scattered among the fossil beds and rock outcroppings. Typical plant species found are spikerushes (*Eleocharis spp*.) and seedlings/saplings of silver maple (*Acer saccharinum*) and willow.

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 5 federally-listed endangered species known to occur in Clark County, Indiana. These species are listed in Table 1. The riparian corridor adjacent to the Ohio River may provide summer roost habitat for Indiana bats. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple, cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor would also provide feeding/foraging habitat for both Indiana and gray bats. The fat pocketbook mussel is a

freshwater species that typically inhabits large river systems. The mussel is typically found in habitats with muddy or sandy substrates and slow flowing water. There does not appear to be suitable habitat for this species in the immediate vicinity of the project area. Running buffalo clover is a species most commonly associated with the ecotone between open forest and prairie. It is unlikely that running buffalo clover exists in the project area. Short's goldenrod occurred on the project area historically. However, it is now considered extirpated from the project area. This plant is adapted to live in plant communities such as "river wash" and other glade-like habitats. Short's goldenrod is currently only found in Blue Licks State Park in Robertson County, Kentucky. Inclusion of this plant in the Falls of the Ohio restoration efforts may help insure future survival of this species.

Table 1. Federally-listed species known to occur in Clark County, Indiana.

Common Name	Scientific Name	Federal Status	Potential Habitat Present
Indiana bat	*Myotis sodalis*	Endangered	Yes
gray bat	*Myotis grisescens*	Endangered	Yes
fat pocketbook mussel	*Potamilus capax*	Endangered	No
Short's goldenrod	*Solidago shortii*	Endangered	Yes
running buffalo clover	*Trifolium stoloniferum*	Endangered	No

Source: U.S. Fish and Wildlife Service, 1999

4.0 Project Diagram

5.0 Falls of the Ohio River Wash Plant Community Restoration Project Design

Existing Ecological Concern: Natural diversity of the native "river wash" plant community occurring within the project area has been degraded over time. Herbaceous plants originally found in the area were adapted to frequent scouring from debris and ice flows. These early-successional plants were able to reestablish themselves quickly following scouring events allowing them to become the dominant species on the area. Placement of the McAlpine Dam immediately upstream from the project area has altered the frequency and intensity of scouring events and allowed woody plants, such as willows and maples, to invade and colonize the spaces once occupied by the native herbaceous plants. This less diverse plant community provides less wildlife habitat resulting in a decline in overall biodiversity in the area.

River Wash Plant Community Restoration Planning: This proposed restoration project is aimed at restoring diversity to the "river wash" plant community. To insure a successful restoration effort, selection of the appropriate plants and microhabitat conditions is important. Several native herbaceous plant species have already been selected for the restoration effort. These plants include:

- Short's goldenrod (*Solidago shortii*),
- obedient plant (or false dragon head) (*Physostegia virginiana*),
- shiny (or round-fruited) St. John's wort (*Hypericum sphaerocarpon*),
- blue wild indigo (*Baptisia australis*),
- smooth phlox (*Phlox glaberrima*),
- big bluestem *(Andropogon gerardii*)
- tall coreopsis (*Coreopsis tripteris*).

Most of these plants will likely grow in the cracks or crevices scattered within the fossil beds and other rock dominated habitats that contain enough soil or silt deposits for the plants to establish roots. Such areas, supporting the appropriate microhabitats for these species, need to be identified within the project area. The Indiana Department of Natural Resources (IDNR), Division of Parks and Reservoirs and Division of Nature Preserves, along with other professionals with experience in plant restoration efforts should be involved in determining exactly which areas are appropriate for the restoration efforts. Because the proposed restoration area is within the Falls of the Ohio State Park, potential disturbance from human visitors on the project area will need to be considered when selecting the proper areas to reintroduce plants.

Plant Acquisition, Planting, and Monitoring: Native plants used for the restoration efforts would be acquired from an approved nursery. This nursery would provide individually potted plants (plugs) of each of the species listed above, including *Solidago shortii.* Individual plants will be planted in the appropriate microhabitat within the project area. Planting methods may need to be adjusted for each individual species to increase survival rates.

To insure successful restoration of the native herbaceous plants on the area, it may be necessary to remove some of the existing willow trees or other woody vegetation that is currently occupying the microhabitats required by the restored plants. Periodic removal of such trees and shrubs may be required in the future to reduce competition with the herbaceous plants if natural scouring events do not control growth of the woody plants. Removal of larger, well-established trees and shrubs may be avoided if enough suitable habitat is present on other portions of the project area for successful restoration of the herbaceous plants.

Establishing viable populations of the herbaceous plants may require plantings for several consecutive years until natural dispersal and germination are effective. Also, subsequent replanting of the native herbaceous plants may be required if natural seed dispersal and

germination do not occur due to scouring events washing the plants and seeds downstream. Monitoring the success of the restoration efforts should initially include biannual or annual visits to the project and surrounding areas to evaluate survival rates of restored plants, seed production, viability, and dispersal, and changes in the overall plant and animal community as a whole over time.

6.0 Cost Estimates

Expected costs for the proposed restoration project are summarized in Table 2.
A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 2. Estimated Costs for Falls of the Ohio River Wash Plant Community Restoration

Item	Costs					
	Year 1	Year 2	Year 3	Year 4	Year 5	**TOTAL**
Planting Design/Management Plan	10,000	-	-	-	-	$10,000
Site Preparation	2,880	1,440	1,440	1,440	1,440	$8,640
Plant Purchase	2,100	1,400	1,400	1,400	1,400	$7,700
Planting	864	576	576	576	576	$3,168
TOTAL	$15,844	$3,416	$3,416	$3,416	$3,416	**$29,508**

7.0 Schedule

The estimated number of days it is expected to take for each of the initial stages of the proposed project are shown in Table 3.

Table 3. Restoration Schedule for Initial Effort

Item	Time
Planting Design/Management Plan	30 days
Site Preparation	10 days
Plant Acquisition	2 days
Planting	3 days
TOTAL	**45 days**

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: Implementation of the proposed project could result in the enhancement of plant communities within the project area. More diverse plant communities may provide potential habitat or food resources for a variety of other organisms, therefore potentially maintaining biodiversity as a whole.

Aquatic Habitats: Aquatic habitat could benefit from the proposed restoration because a more diverse plant community may attract a more diverse group of insects which would provide increased foraging opportunities for fish and other aquatic organisms in the area.

Wetlands: There would be no foreseeable beneficial impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: The restoration of plant communities in the area may be beneficial for the endangered bat species. The restored plant community could potentially support a more diverse insect community, which would supplement the diet of the bat species. There would be no foreseeable beneficial impacts to the endangered mussel or clover species as a result of implementing the proposed project. Short's goldenrod would directly benefit from this project because this plant is currently only found on one other site. Restoring this plant to the project area would provide a second population of this species in case a natural or human caused catastrophe were to destroy the plants in the only existing population at Blue Lick State Park

Socioeconomic Resources: Minor beneficial impacts may occur at the interpretive center located within the Falls of Ohio State Park if the "river wash" plant community was restored. More visitors may come to the area if there were rare plants, such as Short's goldenrod, available to see. The benefits would be the result of an increase in profits from the entrance fees currently required at the area.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be no reasonably foreseeable adverse impacts to terrestrial or riparian resources as a result of implementing the proposed project.

Aquatic Habitats: There would be no reasonably foreseeable adverse impacts to aquatic resources as a result of implementing the proposed project.

Wetlands: There would be no foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no foreseeable adverse impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be no foreseeable adverse socioeconomic impacts as a result of implementing the proposed project.

10.0 Preliminary Maintenance Costs

Maintenance costs for this project are summarized in Table 4. Maintenance would include monitoring the project and surrounding area annually to determine success of restoration efforts and to determine population sizes for individual plant species. Also, replanting of the native herbaceous plants and removal of small, invading woody plants may be necessary periodically. However, if the initial 5-year restoration efforts are successful, replanting may not be necessary every five years. Therefore the costs for replanting shown in Table 4 may not be required.

Table 4. Restoration Maintenance Costs

Maintenance	Frequency	Costs
Restoration Monitoring	Annually	$576
Replanting	Every 5 years	$5,844

11.0 Potential Cost Share Sponsors

- Indiana Department of Natural Resources
- Kentucky State Nature Preserves Commission

12.0 Expected Life of the Project

The life expectancy of this project depends upon the success of the initial restoration efforts and frequency and intensity of future scouring events that occur in the area.

13.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings.

The project involves restoration of "river wash" plant communities on scoured gravel bars and bedrock at the Falls of the Ohio River near the ORM 606 to 605.3 in Clark County, Indiana. The cities of Clarksville and Jeffersonville, Indiana are located along the north shore of the Ohio River near the project area. Louisville, Kentucky is on the south shore of the Ohio River near the project area.

The following environmental conditions were considered when conducting the June 17, 1999 project area inspection:

- Suspicious/Unusual Odors;
- Discolored Soil;
- Distressed Vegetation;
- Dirt/Debris Mounds;
- Ground Depressions;
- Oil Staining;
- Above Ground Storage Tanks (ASTs);
- Underground Storage Tanks (USTs);
- Landfills/Wastepiles;
- Impoundments/Lagoons;
- Drum/Container Storage;
- Electrical Transformers;
- Standpipes/Vent pipes;
- Surface Water Discharges;
- Power or Pipelines;
- Mining/Logging; and
- Other.

There is a potential for significant HTRW activity associated with the metropolitan communities surrounding the project area. None of the environmental conditions listed above were observed on the project area, which is confined to the river and its immediate banks.

14.0 Property Ownership & River Access

Selected data on properties immediately adjacent to or within the concept site was collected from the county courthouse of the respective county of the property. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area which identified each parcel with a corresponding map and parcel number. The map/parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office.

The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used in each State for taxation purposes. These

assessed values reflect 1998 assessments. The assessed valuation ratio is 33.3 percent for Indiana.

The above ratios were used to approximate the market value of each property. However, in many instances the resultant market value calculated under the above procedure is considerably below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.
The collected property data indicate that public lands are adjacent to the Falls Ohio River Wash Plant Community Restoration area. No private lands will be needed or disturbed for this project. The property under consideration is in federal ownership.

Table 5. Property Characteristics

Site Name: Falls of the Ohio River Wash Plant Community Restoration
Location: Clark County, Indiana and Jefferson County, Kentucky

Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
654/14,27,43 (shoreline -Clark County, IN)	U.S. Government			
(Island - Jefferson County, KY)	(No record: assume ownership by U.S. Govt. as adjacent islands U.S. Govt.-owned.)			

* Denotes improvements on property.

15.0 References

IDNR	Indiana Department of Natural Resources, Falls of the Ohio State Park, Informational Brochure.
IDNR, 1999	Indiana Department of Natural Resources, Personal Communications with Cloyce Hedge and Michael Homoya via Phone Conversations and Email.
INHS, 1996	Illinois Natural History Survey Reports, March-April 1996. Survey Document #2152. Center for Biodiversity (J. Hofmann).
KSNPC, 1999	Kentucky State Nature Preserves Commission, Personal Communications with Marc Evans via Phone Conversations and Email.
USACE, 1999	USACE, Louisville District Home Page, History Section, McAlpine Locks and Dam Project History, http://155.80.93.250/ims/history.htm
USFWS, 1999	U.S. Fish and Wildlife Service, July 1, 1999. Federally Listed Endangered and Threatened Species in Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist

Project Site Location: The proposed Falls Ohio River Wash Plant Community Restoration project is located on the north shore of the Ohio River in Clark County, Indiana, near Clarksville and Jeffersonville, and is due north of Louisville, Kentucky. The project area is located within the 68 acre Falls of the Ohio State Park which lies within the 1,404 acre Falls of the Ohio National Wildlife Conservation Area. The area is located in Cannelton Pool between ORM 605.3 and 606. The area is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Description of Plan selected: The primary goal of the Falls Ohio River Wash Plant Community Restoration project is to restore the native "river wash" plant community that once existed on the exposed bedrock, fossil beds, and gravel bars adjacent to the shoreline. This plan would require acquisition and planting of native herbaceous plants and potential removal of woody vegetation such as willows within the project area.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? Yes and description

1. Attempt restoration effort by planting fewer plants of each of the proposed species.
2. Limit removal of existing woody vegetation and plant herbaceous plants only in areas not currently occupied by any trees and shrubs.

Larger Size Plan Possible? Yes and description

Increase the size of the restoration area to include more of the rocky habitats within the Falls of the Ohio State Park. Also, the number of native herbaceous plant species and plants of each could be increased.

Other alternatives? No

Restore/Enhance/Protect Terrestrial Habitats? Yes **Objective numbers met** T4

Restore, Enhance, & Protect Wetlands? No **Objective numbers met**

Restore/Enhance/Protect Aquatic Habitats? Yes **Objective numbers met** A3, A8

Type species benefited: Herbaceous plants, fishes, bats, and possibly others..

Endangered species benefited: Indiana bats, gray bats, and Short's goldenrod.

Can estimated amount of habitat units be determined: Approximately 2-3 total acres of shoreline habitat will be restored to "river wash" plant community.

Plan acceptable to Resources Agencies?

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Yes – Indiana DNR

Plan considered complete? **Connected to other plans for restoration?**

Real Estate owned by State Agency? Yes **Federal Agency?** Yes
Real Estate privately owned? No
If privately owned, what is status of future acquisition

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

Yes, this plan contributes to the function and structure of the native "river wash" plant community once found on the area. Plan provides increased habitat diversity and successful restoration would help maintain biodiversity along the mainstem of the Ohio River.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost-effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?
Yes / No
Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity:_____
Non-government Entity _____

Corps Contractor _____Date_____

U.S. Fish & Wildlife Representative _____Date_____

State Agency Representative _____Date _____

U.S. Army Corps of Engineers Representative _____Date _____

Terrestrial Habitat Objectives

T1 Riparian Corridors

T2 Islands

T3 Floodplains

T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

W1 Forested Wetlands: Bottomland Hardwoods

W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands

W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)

A2 Riverine submerged and aquatic vegetation

A3 Sand and gravel bars

A4 Riffles/Runs (tailwaters)

A5 Pools (deep water, slow velocity, soft substrate)

A6 Side Channel/Back Channel Habitat

A7 Fish Passage

A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)